Seasonal prevalence of House Sparrow (*Passer domesticus*) haemoparasites

Jeromhia Aly and Ben Skipper, Biology Department, Angelo State University, San Angelo, TX 76909

Introduction

- Secondary sexual ornaments are prominent among sexually reproducing species (e.g., antlers of deer and tails of peacocks).
- It is hypothesized that the full expression of these ornaments is conditioned upon the health of the individual (Hamilton and Zuk 1982).
- As such, ornaments serve as an honest advertisement of individual quality to potential mates.
- The badge size of male House Sparrows has previously been shown to correlate with immunocompetence during the breeding season.
- The relationship between badge size and immunocompetence is unknown outside of the breeding season.

Objectives

- Determine the relationship between badge size of adult male House Sparrows and measures of immunocompetence outside of the breeding season.

Methods

- Adult male House Sparrows were captured with mist nets in San Angelo, TX.
- Morphological measurements (bill length, mass, tail length, tarsus length, and wing length) were recorded and individuals were fitted with a uniquely numbered aluminum leg band.
- Blood was drawn (15 µl) from the brachial vein of the wing and birds were photographed to document badge size.
- Badge size was scored on a 1-5 scale (Figure 1).
- Extracted blood was used to make blood smears and smears were stained with Giemsa stain.
- Blood smears were viewed at 1000x magnification and the number of haemoparasites and leukocytes were counted for 50 fields of view.
- Leukocyte abundance was regressed against badge size and an index of body condition (mass/tarsus length).

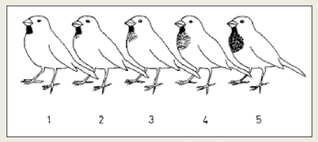


Figure 1. Qualitative scoring of House Sparrow bib size.

Results

- Thirty adult male House Sparrows were captured. One sparrow was censored due to a missing mass measurement.
- No haemoparasites were observed in any of the blood smears.
- On average 9.27 (± 5.02 SD) leukocytes (Figure 2) were observed in each blood smear.
- A summary of morphological measurements and leukocyte counts is presented in Table 1.

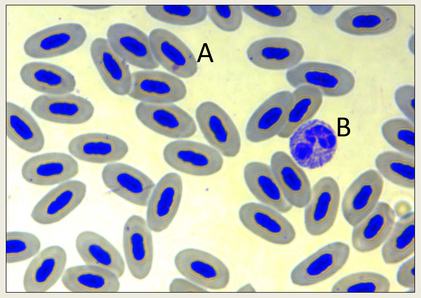


Figure 2. Example of stained erythrocytes (A) and leukocytes (B) from an adult male House Sparrow. Magnification 1000x.

Table 1. Summary of morphological measurements and leukocyte counts from adult male House Sparrows.

	Mass[a]	Tarsus[b]	Tail[b]	Wing[b]	Bill[b]	Leukocytes
Mean	27.11	20.70	58.03	77.78	12.92	9.27
SD	1.36	0.66	2.38	1.68	0.51	5.02

[a] Grams
[b] Millimeters

- Leukocyte abundance had a weak, negative relationship (r^2 = 0.091) with House Sparrow badge size (Figure 3).
- As body condition index increased leukocyte abundance showed a weak, positive increase. (r^2 =0.19; Figure 4).

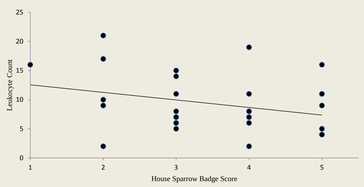


Figure 3. Relationship between House Sparrow badge size and leukocyte prevalence.

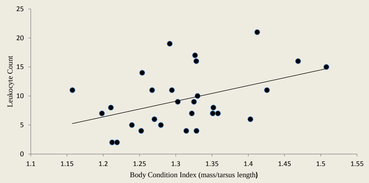
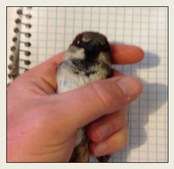


Figure 4. Relationship between body condition index and leukocyte prevalence.



Discussion

- The failure to detect any haemoparasites is surprising: previous research has shown haemoparasite prevalence rates to be 7 - 41% (Valkiūnas et al. 2006) in House Sparrow populations.
- It is likely that the granivorous diet of House Sparrows during winter limited the incidence of parasitic infection.
- Additionally, samples were collected from February through early April, a period of the year when parasite vectors (e.g., mosquitos) are few.
- Increased prevalence of leukocytes is typically an indicator of a compromised immune system or stress.
- The badge size data weakly supports the Hamilton and Zuk hypothesis that secondary sexual ornaments are an indicator of immunocompetence.
- Counterintuitively, House Sparrows with higher body condition scores tended to show greater prevalence of leukocytes.
- Explanations for these contradictory results are unclear, however these results are preliminary and data collection is ongoing.

Future Directions

- Sampling of House Sparrows will continue through mid-May.
- Complete quantitative assessment of badge size in lieu of the qualitative assessment presented here.
- Reanalyze data with relative abundance of leukocytes.

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